

Resilience Stress Testing: Toward agnostic and system-focused resilience assessments

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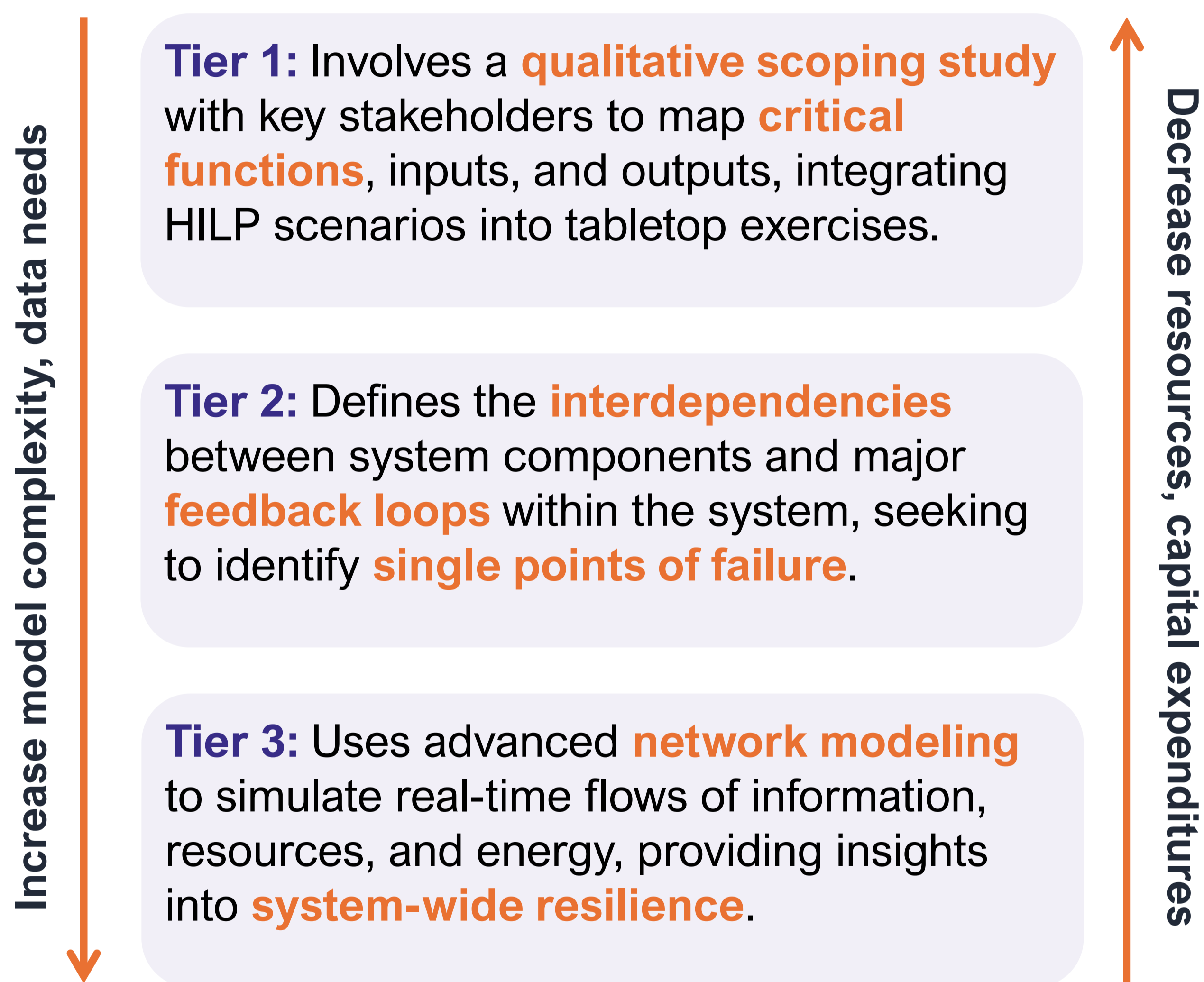
Disasters often have far-reaching effects beyond their initial impact, cascading through a systems' network. As climate change accelerates, the frequency of high-impact low-probability (HILP) events climbs, requiring a paradigm shift in global risk management strategies. Traditional risk assessments and Stress Testing tend to focus on specific hazards and context-dependent scenarios, but this often overlooks the complex interdependencies within systems, as well as their interactions with other systems.

AGILE addresses this challenge by developing a tiered risk and resilience stress testing framework that aims to assess systemic vulnerabilities in a threat-agnostic manner, consisting of three levels of increasing complexity and analytical depth.

Tiered Approach

Work in progress

Guiding Principles



- The system under analysis and its boundaries need to be clearly defined. Fundamental system properties need to be characterized before starting stress testing.
- Resilience is an **emergent property of the system**.
- Each tier builds on top of the previous with a **cumulative rationale**, entailing a progressively complex level of information and resources.
- Evaluate system resilience in a **threat-agnostic** manner, focusing on vulnerabilities and critical functions (consequences) instead of specific threats (causes).
- **Involve stakeholders** from the outset, across all tiers.
- Clearly **define the roles** of technicians and stakeholders, distinguishing between who performs the stress test and who utilizes the tool for management and decision-making.

This ST framework aims to provide a more comprehensive understanding of how systems adapt to HILP events. It addresses the unique challenges posed by increasingly interconnected networks, fostering resilience against a wide range of potential disruptions.

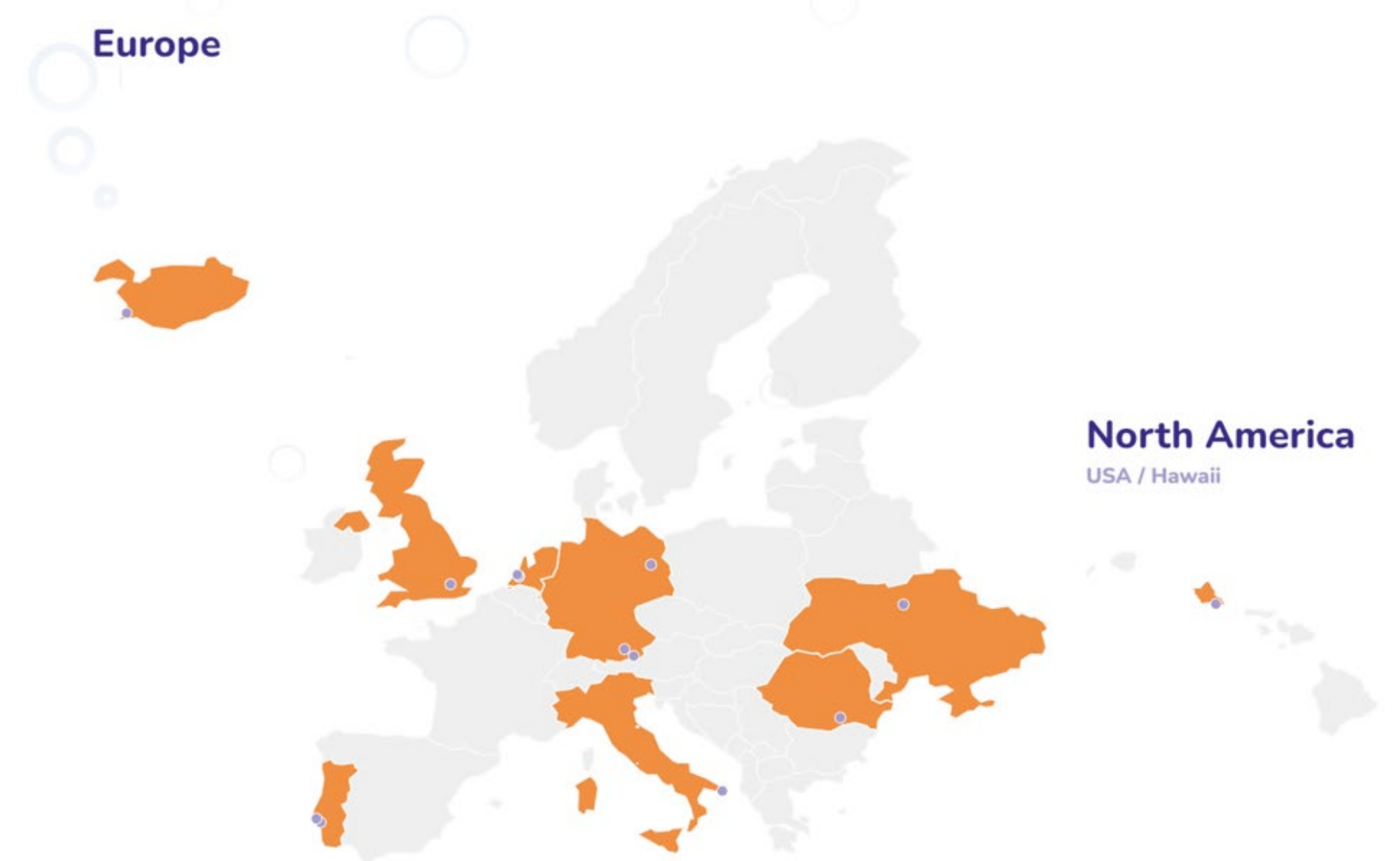
Moving forward...

- Utilizing a formal structure to define the system (Social-ecological framework).
- Defining critical functions – ecological and levels of service.
- Mapping and defining stakeholders and actors involved.
- Focusing on HILP events that guarantee cascading disruptions.

AGILE will apply its Stress Testing framework and methodology to 9 Case Studies:

- rescEU EMT
- Bucharest
- Iceland
- Arrábida Territory
- Ukraine
- Rotterdam
- London
- Venice Metropolitan City Area
- Pacific Region

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Partners and case studies

Linkov, I., Trump, B. D., Trump, J., Pescaroli, G., Hynes, W., Mavrodiya, A., & Panda, A. (2022). Resilience stress testing for critical infrastructure. *International Journal of Disaster Risk Reduction*, 82, 103323; Linkov, I., Fox-Lent, C., Read, L., Allen, C. R., Arnott, J. C., Bellini, E., ... & Woods, D. (2018). Tiered approach to resilience assessment. *Risk Analysis*, 38(9), 1772-1780; McGinnis, M. D., & Ostrom, E. (2014). Social-ecological system framework: initial changes and continuing challenges. *Ecology and society*, 19(2); Ostrom, E. (2007). A diagnostic approach for going beyond panaceas. *Proceedings of the national Academy of sciences*, 104(39), 15181-15187.

